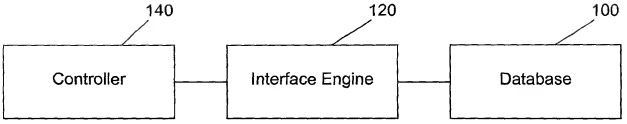

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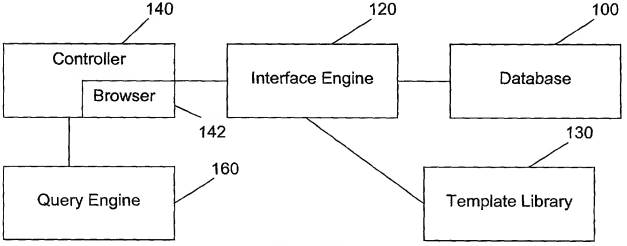

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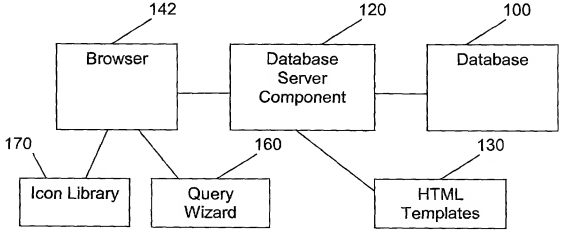

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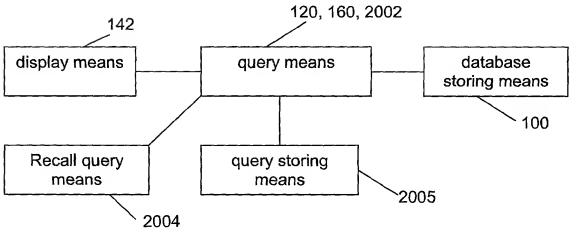

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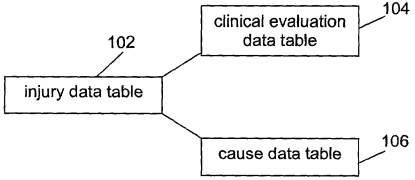

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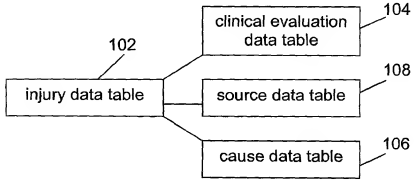

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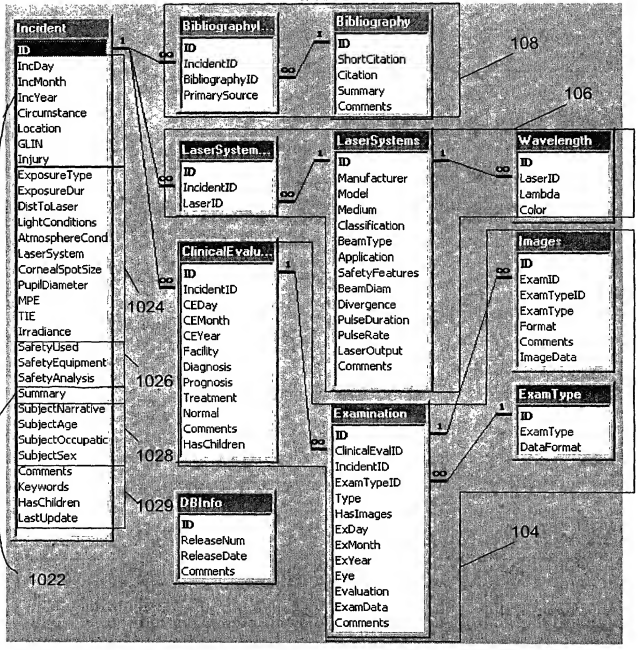

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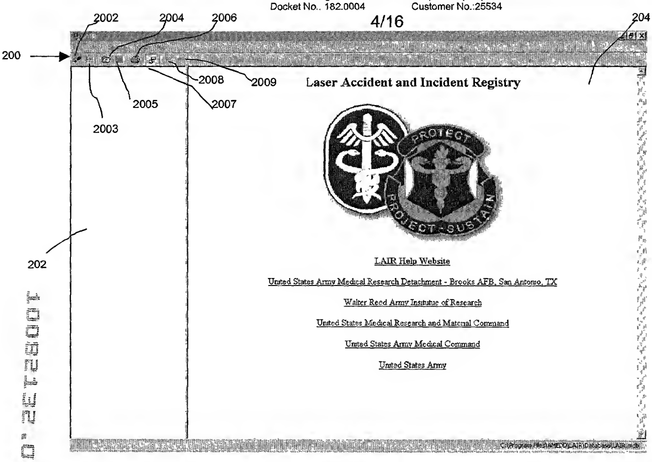

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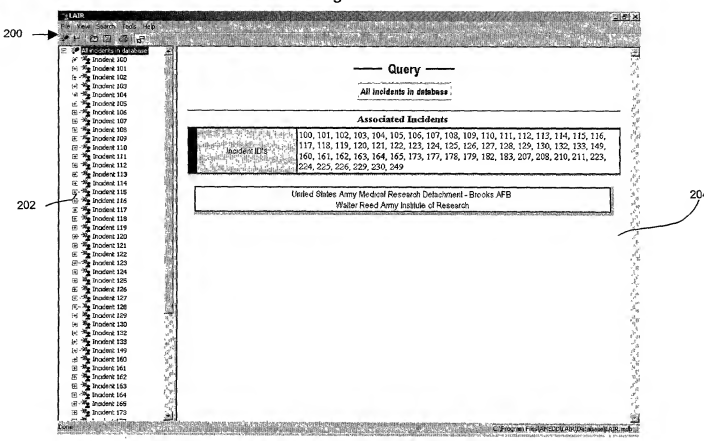

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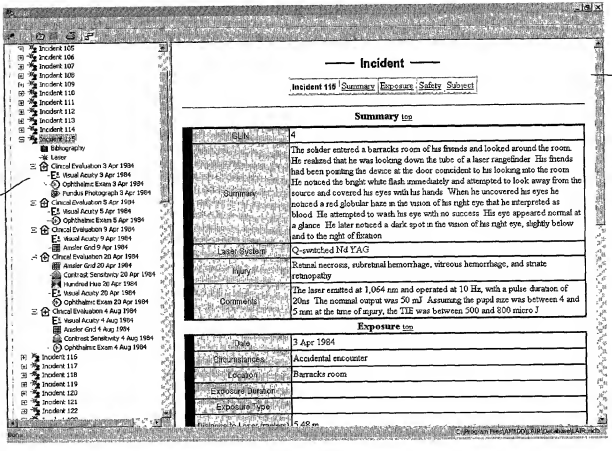


Figure 6(a)

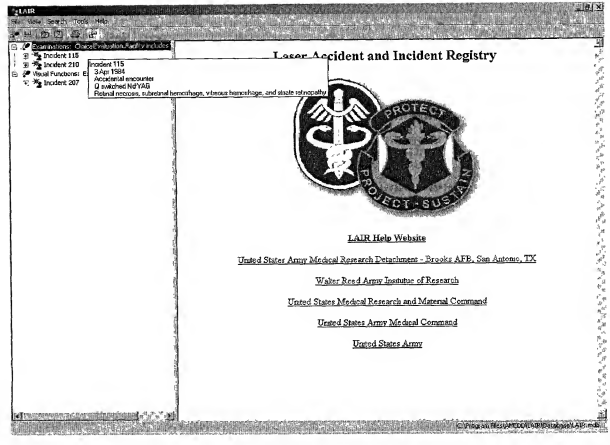
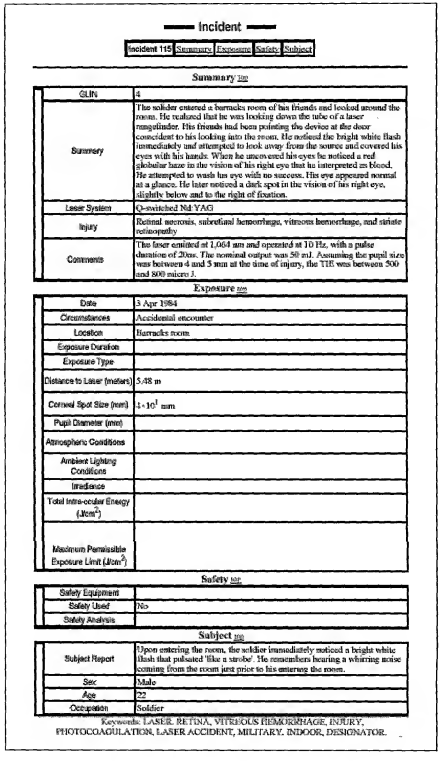


Figure 7



Incident

Incident 115 | Summary | Exposure | Safety | Subject

Summary top

GUN	4
Summary	The soldier entered a barracks room of his friends and looked around the room. He realized that he was looking down the tube of a laser rangefinder. His friends had been pointing the device at the door coincident to his looking into the room. He noticed the bright white flash immediately and attempted to look away from the source and covered his eyes with his hands. When he uncovered his eyes he noticed a red globular haze in the vision of his right eye that he interpreted as blood. He attempted to wash his eye with no success. His eye appeared normal at a glance. He later noticed a dark spot in the vision of his right eye, slightly below and to the right of fixation.
Laser System	Q-switched Nd:YAG
Injury	Retinal necrosis, subretinal hemorrhage, vitreous hemorrhage, and striate retinopathy
Comments	The laser emitted at 1,064 nm and operated at 10 Hz, with a pulse duration of 20ns. The nominal output was 50 mJ. Assuming the pupil size was between 4 and 5 mm at the time of injury, the TIE was between 500 and 800 micro J.

Exposure top

Date	3 Apr 1984
Circumstances	Accidental encounter
Location	Barracks room
Exposure Duration	
Exposure Type	
Distance to Laser (meters)	5.48 m
Corneal Spot Size (mm)	1×10^{1} mm
Pupil Diameter (mm)	
Atmospheric Conditions	
Ambient Lighting Conditions	
Irradiance	
Total Intra-ocular Energy (J/cm^2)	
Maximum Permissible Exposure Limit (J/cm^2)	

Safety top

Safety Equipment	
Safety Used	No
Safety Analysis	

Subject top

Subject Report	Upon entering the room, the soldier immediately noticed a bright white flash that pulsated 'like a strobe'. He remembers hearing a whirring noise coming from the room just prior to his entering the room.
Sex	Male
Age	22
Occupation	Soldier

Keywords: LASER, RETINA, VITREOUS HEMORRHAGE, INJURY, PHOTOCOAGULATION, LASER ACCIDENT, MILITARY, INDOOR, DESIGNATOR.

Figure 6(b)

Bibliography

Incident 115

Sources

Sources	Kearney 1987	Kearney, J.J., Cohen, H.B., Stuck, B.E., Rudd, G.P., Beresky, D.E., Wertz, F.D., 'Laser injury to multiple retinal foci.' Lasers in Surgery and Medicine 7, pp 499-502 (1987)
	Kearney 1985	Kearney J. J., Stuck, B. E., Zwick, H., Keller, J. B. 'James Johnson: Clinical Summary' (unpublished notes). Presidio of San Francisco: Letterman Army Institute of Research, April 1884 - January 1985
	Stuck 1996	Stuck, B.E., Zwick, H., Molchany, J., Lund, D.J., Gagliano, D.A., 'Accidental human laser retinal injuries from military laser systems,' SPIE, Proceedings of Laser-Inflicted Eye Injuries: Epidemiology, Prevention, and Treatment, Vol. 2674, pp 7-20 (1996)

top

Figure 6(c)

Laser System

Lasers referenced in Incident 115

Laser Systems

Laser Information	(Unspecified) Q-Switched Nd:YAG
	Pulsed, Nd:YAG
	Wavelength(s): 1.064 µm
	Comments: See Incident Summary and Comments for details

Figure 6(d)

Clinical Evaluation

Incident 115 | Summary | Comments

help

Summary top

Date	3 Apr 1984
Abnormal Results	Abnormal visual functions
Diagnosis	Visual acuity OD 20/400, a small vitreous hemorrhage, plus three visible retinal lesions. Visual acuity OS 20/20
Treatment	Corticosteroids in the form of dexamethasone IV 10 mg initially and 4mg every 6 h for 48 h.
Prognosis	
Facility	Emergency Room

Comments top

Exam Details Available	Yes
Comments	Patient was examined at emergency room shortly after injury.

Figure 6(e)

Examination

Incident 115 / Clinical Evaluation 208

Exam Type: Ophthalmic Exam

Summary | Results

Summary top

Date	20 Apr 1984
Eye	OU
Evaluation	All exams in the left eye were normal. Right eye - A small inferior vitreous hemorrhage was evident. Three foci of retinal injury with whitening of retina, retinal defect and subretinal blood were present. The foci were arrayed on a line and were equally spaced

Results top

Notes and Observations	OU: In addition to the specific exams reported, additional exams were performed on the patient. Farnsworth D-15 and Desaturated Farnsworth D-15 were normal for both eyes. Stereo acuity - 80 seconds of arc, normal indicating that the patient had retained binocularity in the fovеal areas of the retina. Dark adaptometry - elevated threshold in the right eye compared to the left eye, but at upper limit of normal. Fluorescein angiography - retinal, retinal pigment epithelial and choroidal ruptures present; subretinal blood evident in the right eye. Electrophysiology - normal electroretinogram, electrooculogram, and visual evoked cortical potential

Figure 6(g)

Examination

Incident 115 / Clinical Evaluation 205

Exam Type: Visual Acuity

Summary | Results

Summary top

Date	3 Apr 1984
Eye	OD, OS
Evaluation	

Results top

Measured Acuity	OD: Snellen,20/400 OS: Snellen,20/20

Figure 6(h)

Examination

Incident 115 / Clinical Evaluation 205

Exam Type: Fundus Photograph

Summary | Results | Images

Summary top

Date	3 Apr 1984
Eye	OD
Evaluation	Examination of the right eye showed a visual acuity of 20/400, a small vitreous hemorrhage, plus three visible retinal lesions. One lesion was located slightly superior and nasal to the fovea centralis. A second was at the superior aspect of the optic disk, The perifoveal lesion was most prominent, whereas the one superonasal to the optic disk was least prominent. Each lesion was accomplished by varying degrees of subretinal hemorrhage. It was interesting to note that the three lesions defined a straight line and were equally spaced, attesting to the repetitive pulse nature of the laser instrument. The remainder of the examination of the right eye and the examination of the left eye were normal.

Results top

Dyes used	

Images top

Images	Fundus photo taken the same day as the injury.  Taken the day of the injury 

Figure 6(f)

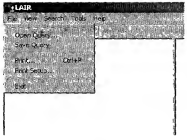
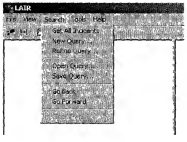


Figure 8(a)

Figure 8(b)



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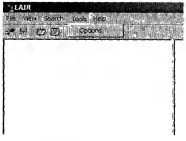
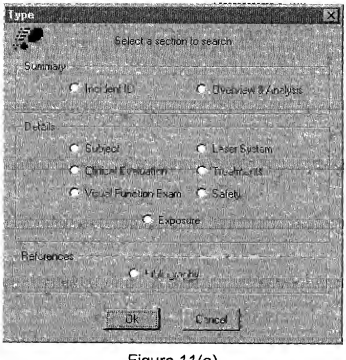


Figure 8(d)

Figure 8(e)



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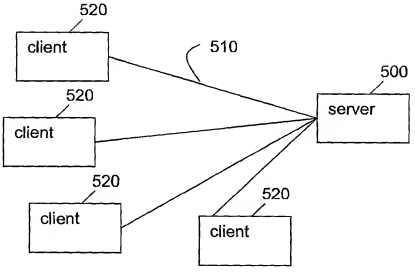

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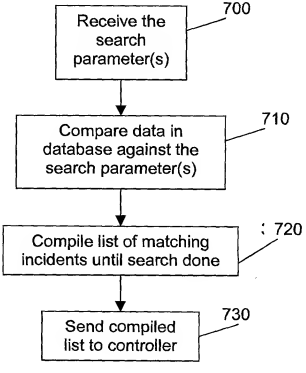
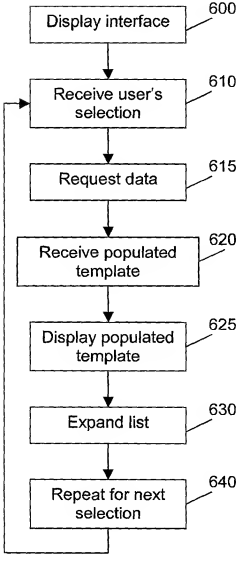


Figure 10(b)



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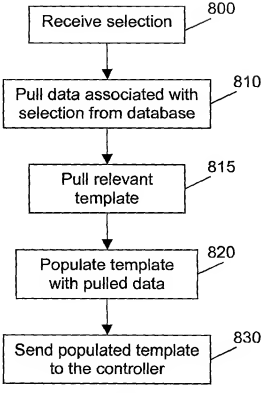

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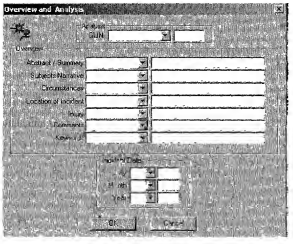

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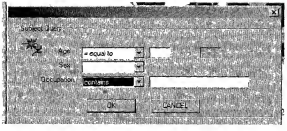

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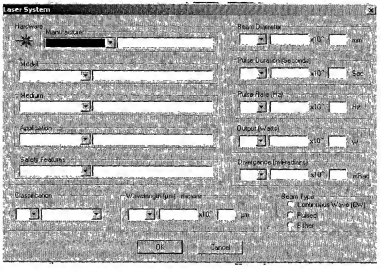

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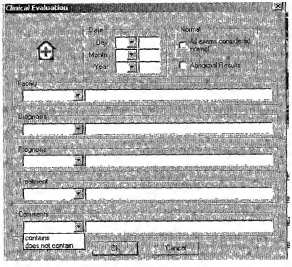

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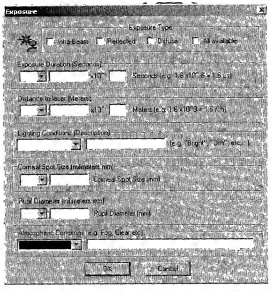

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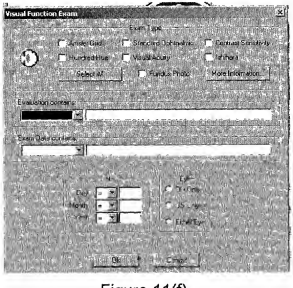

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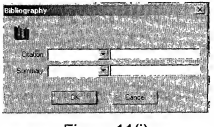

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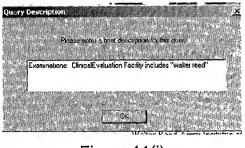

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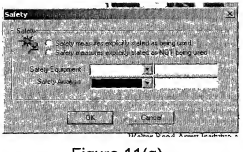

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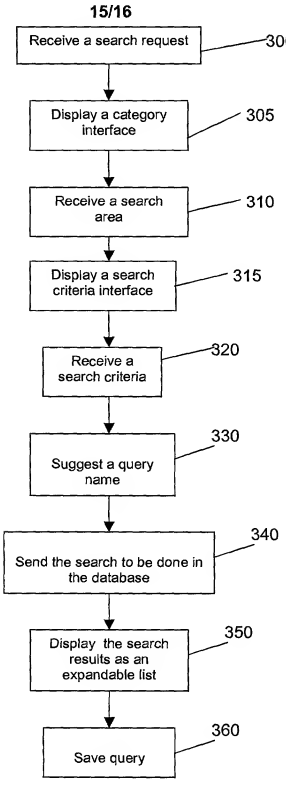

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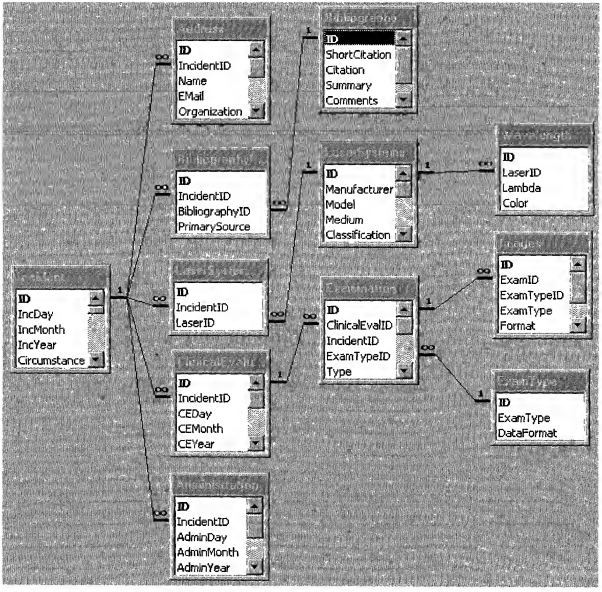

Figure 13